

IN THE SPECIFICATION

[0048] The “Figure-8” cartridge 38 preferably comprises carbon steel which may be drawn into thin-walled tubes while achieving sufficient strength, such that the battery installed therein achieves superior power and cell capacity. It is further impermeable to water vapor transport and to carbon dioxide transport. The cartridge 38 may be manufactured by providing a round tube and crimping the tube longitudinally on opposite sides to form adjacent cell compartments 67. The tube is not crimped completely through its diameter, however, such that the center remains open to provide a bypass air flow tube 60 (See Figs. 4 and 5) that allows maximum air to flow through the cartridge 38, as will be explained in more detail below. Another method of manufacture is to start with a flat metal sheet and draw it into a figure 8 shaped can with a closed bottom, as is understandable to those skilled in the art of drawn metal components. Alternatively, the cartridge 38 may be molded in plastic to provide the “Figure-8” design. A nipple 32 is formed in the cartridge to provide a positive terminal for engagement with the battery compartment of an electronic device. The result is a cartridge 28 38 that has a closed bottom 33, adjacent cylinders 67, and a nipple 32, and that is seamless to minimize or eliminate leakage during operation.

[0056] Referring now to Figs. 4 and 5, the internal components of cartridge 38 are illustrated. As described above, housing 36 includes a pair of cell compartments 67 in a “figure-8” configuration and air mover chamber 41 that are separated by a divider plate 43 47 extending laterally across the cartridge. A pair of metal-air cells 40 that produce a current at a pre-determined voltage when exposed to a flow of oxygen is disposed in the each compartment 67, respectively. An annular conduit, or plenum, 66 is defined by the gap that is disposed between the outer wall of cell cathode 46 and the inner surface of the battery housing 36. Cells are held in place within housing 36 via a spring or any alternative suitable mechanical fastener, as appreciated by a skilled artisan.

[0061] Referring once again to Fig. 4, the air mover chamber 41 contains an air mover assembly having an air mover, such as a variable-speed fan 50 that, during operation, draws air from the battery compartment 22 via inlet 43, and expels the air into the active section of the battery via an inlet diffusion tube 52 that interfaces with an opening 54 extending through plate 43 47. Opening 54 is axially aligned with bypass air flow tube 60 to enable fluid

communication between the air mover chamber 41 and cartridge 38. The operation of fan 50 is controlled by electronic circuitry 456 that controls the speed of fan 50 depending upon the quantity of oxygen needed across the cells 40 to provide only the necessary power to operate the electronic device and also the fan, as is illustrated in Fig. 6, which is described in more detail below. Because many electrical devices of this type are not completely air tight, the suction created at the inlet of the fan 50 is sufficient to draw fresh air from the ambient environment, into the camera 24, and ultimately into the battery compartment 22 to be received by the fan 50. The air is illustrated as entering the battery compartment 22 at several locations, which are symbolically identified as openings 58. Accordingly, the air circulated throughout the cartridge 38 is maintained at a sufficiently high oxygen concentration so as to support the discharge of the metal-air cells 40. It should be appreciated that openings 58 are typically small so as to render conventional air managers inoperable, as described above.

[0075] The net effect is that the speed of the motor is made functionally dependent on the amount of current drain from the cells 40a and 40b and thus the amount of air circulation is made dependent on the power being drawn from the battery. Power inputs to the motor controller 420 430, the amplifier 428 and the proportional amplifier 426 are switched off when the demand current 420 being drawn from the batteries 40a and 40b, as sensed by resistor 414, is below a certain threshold thus conserving power for low power drains and prolonging the activated shelf life of the batteries. During the time when current drain from the cells 40a and 40b is below the threshold established by the current amplifier 410 and the sensing resistor 414, the air mover 50 is deactivated.

IN THE DRAWINGS

Marked-up Drawing Sheets 3-8 are presented illustrating amendments to Figs. 3, 4, and 6-9. New Formal Drawing Sheets 1-12 bearing Figs. 1-13 are enclosed.